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HIT PC GAME

SimEarth™

The Living Planet

MAXIS



imagineer

INSTRUCTION BOOKLET

SUPER NINTENDO
ENTERTAINMENT SYSTEM

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Thank you for selecting, SimEarth™ The Living Planet for the Super Nintendo Entertainment System®. Warning: please read the enclosed consumer information & precaution booklet carefully before using your Nintendo® Hardware System or Game Pak.

Warning

- 1** Make sure to disconnect the AC adapter from the outlet after playing the game.
- 2** Do not get too close to the screen while you play the game.
- 3** For your safety, take a 10 to 15 minute break every two hours.
- 4** This is a high precision game. It should not be played or stored in places that are very hot or cold. Do not hit or drop it. Never disassemble it.
- 5** Do not touch the connectors. Do not get them wet or dirty. Doing so may damage the game.
- 6** Do not clean with benzene, paint thinner, alcohol or other such solvents.

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WHAT IS SIMEARTH?

SimEarth is a Planet-Simulation game. Its true enjoyment lies in not limiting your imagination by simply trying to accomplish a goal, but by learning and exploring new ideas. SimEarth is a game that is more than a game.

SimEarthlings are electronic life-forms that populate your planet. They vary from unicellular organisms to an intelligent species that has reached an even higher level of civilization than the human earthlings. More than one trillion SimEarthlings can live on a single planet, and their entire fate is in your hands.

You are in complete control of the planet's environment, life and civilization. Your planet has an unlimited potential. SimEarth has a truly exciting challenge that you cannot find in other games.

THE GAIA THEORY

What is life? The originator of the Gaia Theory, James Lovelock, faced this question when he was involved in research on the Martian atmosphere. He was searching for evidence of life on Mars.

Today, the atmosphere on Earth is composed of 0.03% Carbon Dioxide, 21% Oxygen and 79% Nitrogen. Assuming that there is no life on Earth makes the atmosphere 98% Carbon Dioxide and 0% Oxygen. Lovelock, who focused on this relationship between the atmospheric composition and life-forms, came to advocate an idea which he called the Gaia Theory.

Lovelock's Gaia Theory suggests that development of life-forms changes the environment of a planet. Life forms follow the law of natural selection. For example, through respiration, organisms physically and scientifically affect the environment. The earth's environment can also be interpreted as a self-regulating system in which organisms strive to create a sustaining balance in their surroundings.

The Gaia Theory is not the kind of theory that is widely accepted at academic settings. However, in believing this theory, we can say that an increase of CO₂-producing greenery on earth is the solution to atmospheric and ocean pollution.

HOW TO USE THE CONTROLLER

L Button:

Displays a map that shows the present location on the Edit mode Screen

Control Pad:

Moves the cursor

R Button:

Displays a map that shows the present location on the Edit mode Screen

Y Button:

Brings up the command window in the Edit mode Screen

X Button:

Select Button:

Switches from the Edit mode to the Map mode and vice versa

Start Button:

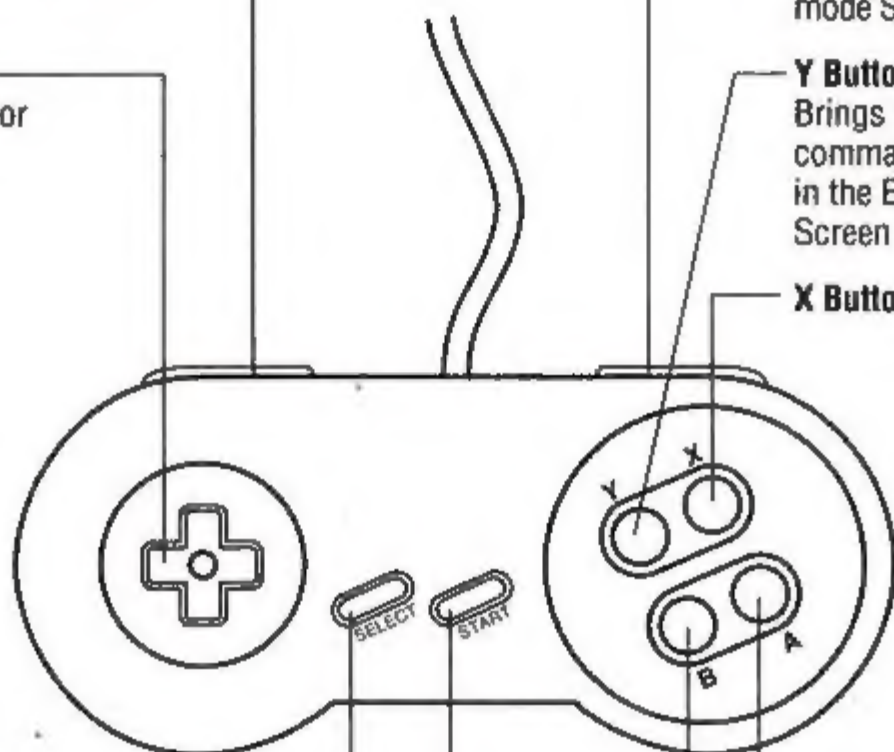
Starts the game; brings up the icons in each mode

A Button:

Used to select commands and menus

B Button:

Used to cancel commands and menus



GAME START



Insert the SimEarth Game Pak in the Super Nintendo Entertainment System® and turn on the power. The title screen will be displayed. Now press the start button so that the mode selection screen (bottom right) appears.



Selecting the FIRST SCENARIO will take you to AQUARIUM. Unless you complete this scenario, you cannot proceed to the next. The content and goal of each scenario are explained in the following pages.

If you select RANDOM PLANET, choices of difficulty levels will be given. Details on the various scenarios and on selection of levels are shown on page 8-16 and page 17 respectively.

PLANET SCENARIOS

After you select FIRST SCENARIO, you will have a choice of eight different planets. Choose one of these planets on which to practice your planetary development skills. Once all the problems have been solved, the scenario ends and is automatically saved. Proceed to the NEXT SCENARIO. If you do not clear the scenarios in order, you cannot go on to the next.

You can choose the Earth-like planets by their time scales. RANDOM PLANET has fewer limitations compared to the FIRST SCENARIO option; therefore, it is possible to set up a time scale. THE DAISY WORLD option is a special scenario that is based on Lovelock's Gaia Theory.

- ▶ First Scenario
 - Aquarium Scenario
 - Cambrian Scenario
 - Modern Day Earth Scenario
 - Mars Scenario
 - Venus Scenario
 - Planet of Ice Scenario
 - Dune Scenario
 - Earth 2XXX Scenario
- ▶ Random Planet
- ▶ Daisy World

The Aquarium Scenario



The Aquarium planet is entirely water; there is no land.

In the process of modernization, fire plays an important role. Tools are the key to building a civilization and can only be made by using fire. If there is no land, fire cannot be made. In short, no matter what intelligent aquatic organisms may grow, they will not be able to create a modern civilization.

TIME SCALE: Evolution time scale

Problems: Since there is no existing land, organisms cannot develop into land animals. Because they cannot use fire, it is impossible for them to create a modern civilization.

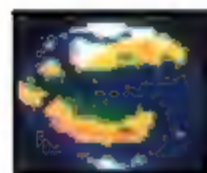
Hints: To make aquatic organisms develop, it is necessary to provide them with shallow water. Land is also needed for civilization. Start by creating land with volcanic eruptions, or you may use the EARTH command to elevate undersea earth surfaces.

Other Hints: You may design the land into whatever shape you wish.

Advancement

Conditions: Make living organisms create a civilization.

The Cambrian Earth Scenario



This is the scenario that replicates the condition of the Earth in the Cambrian Period (approximately 550 billion years ago). At this time, plants begin to multiply and insects to evolve. The goal of this scenario is to have all life-forms evolve until the point where the civilizations can initiate an Industrial Revolution.

In the Cambrian scenario, the continents are shaped the same as the Earth used to be. Additionally, the magma current and the continental drift occur in the same way as they did 200 billion years ago. After the first 200 billion years, the conditions may change in accordance to the magma current changes.

TIME SCALE: Evolution time scale

Problems: Drastic changes in temperature occur. If you do not do anything about this problem, every life-form will perish.

Hints: Protect the animals from temperature change and help intelligent species develop civilizations.

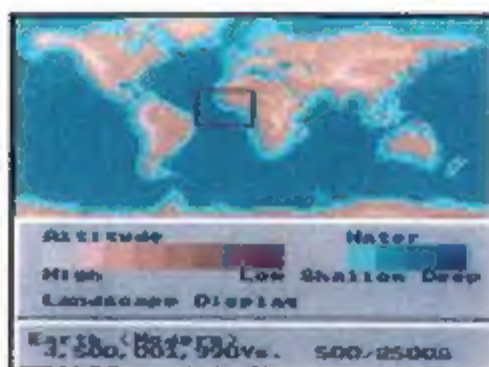
Other

Information: Species which could develop civilizations are not limited to mammals. Experiment by making any species more intelligent and see how far they evolve.

Advancement

Conditions: Make a species develop a civilization in order for an Industrial Revolution to occur.

The Modern Day Earth Scenario



This scenario is the present-day Earth. An Industrial Revolution has occurred and energy production, medical science, agriculture, and technology have rapidly developed. At the same time, environmental problems have become serious.

Your mission is to make humanity emigrate to another planet as well as to solve these problems.

TIME SCALE: Technology time scale

Problems: Pollution, war, famine, the greenhouse effect, energy shortage, and nuclear winter are serious problems. If you find a way to solve these crises, you could win a Nobel Prize.

Hints: War occurs when food, fuel and nuclear power are short. To stop this, allocate energy to Philosophy in the Civilization Model Control Panel. Increase the usage of energy that will not pollute the atmosphere.

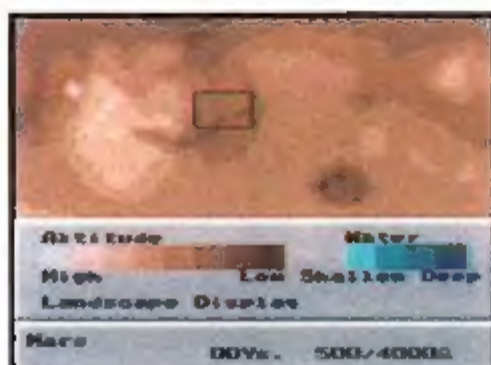
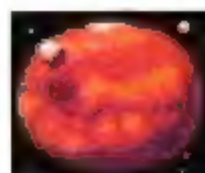
Other

Information: If you get tired of this helpless planet, it might be necessary to destroy the whole world.

Advancement

Conditions: Put into action the Exodus Project and actualize the emigration of humanity to another planet.

The Mars Scenario



For this scenario, your intelligent species are living in a Nanotech-level society. Your planet is overcrowded with SimEarthlings and they are willing to move to another planet.

Your job is to turn Mars into a planet capable of supporting life. You must complete the project within 200 years.

TIME SCALE: Technology time scale

Problems: No water, almost no atmospheric pressure, no oxygen, no plants or animals; there is nothing but rock. The average temperature is -53 degrees Celsius. These are obviously not good living conditions.

Hints: Use an ice meteor to create oceans. Select the icon to see REPORT to get information on all the life-forms as well as the civilized populations of the planet. Make use of Bio and Rain factories to grow plants.

Advancement

Conditions: Increase the entire number of life-forms to 25,000 and the civilized populations to 1000.

The Venus Scenario



As you did in Mars, proceed with the development so that life may live on Venus. The average temperature here is 470 degrees Celsius—far too hot for any organism to survive. This is the game's most challenging scenario. Your job is to change this planet into a place fit for survival. Your time limit is 500 years.

TIME SCALE: Technology time scale

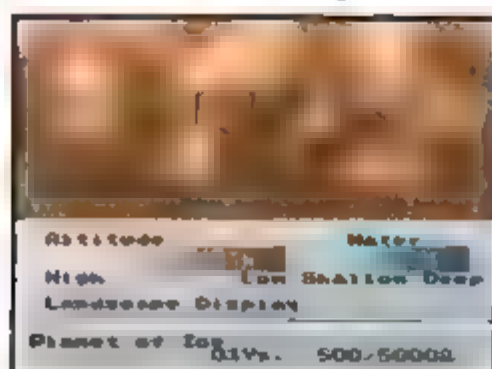
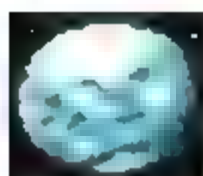
Problems: The temperature is far too high even for plants to grow and animals to live.

Hints: The first thing you must do is cool the planet. It will be useless to drop ice meteors to decrease the temperature—instead it will increase the greenhouse effect inducing vapor into the atmosphere. To cool the planet, remove the carbon dioxide from the atmosphere. This will reduce the greenhouse effect. The Oxygen Factory will absorb the CO₂ from the air and will release oxygen. Green plants will release additional oxygen in the air.

Advancement

Conditions: Make the civilized populations reach 1000 and the number of life-forms reach 25,000.

The Planet of Ice Scenario



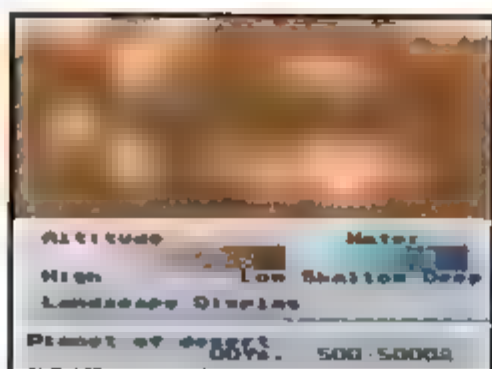
This planet is far away from the sun. Almost no light reaches the surface, so it is almost entirely covered with snow and ice. The temperature is, of course, too low to be able to support life. Your goal is to develop the entire life mass into 25,000 inhabitants and the civilized population to 1000 beings, all within a time limit of 500 years.

TIME SCALE: Technology time scale

Problems: Melt the ice to create a habitable environment

Hints: Control the atmospheric conditions and gradually raise the temperature. The Mars scenario may give you an idea how to do this.

The Dune Scenario



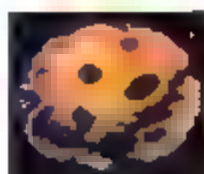
This is a desert planet. The temperature is too high and the weather too dry to support life. The only living life-forms are the reptiles. To successfully complete this scenario, you must develop the life mass into 25,000 inhabitants and the civilized population to 1000 within a 500-year time limit.

TIME SCALE: Technology time scale

Problems: Most of the planet surface has turned into a desert due to the lack of water (rainfall) Change this Dune Planet into a planet covered with greenery in order to create an environment for animals to live

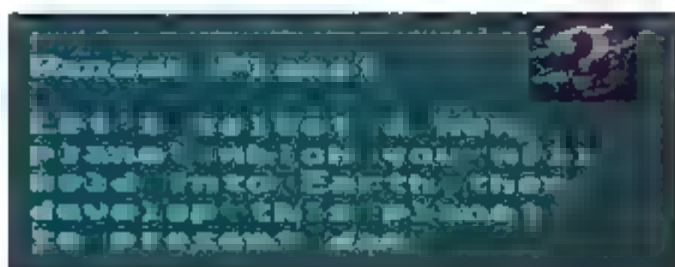
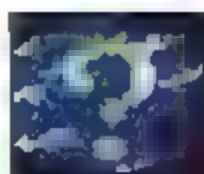
Hints: Control the atmospheric composition and gradually lower the planet's temperature. The Venus scenario might give you a hint. After the temperature of the planet is lowered, it may be effective to drop ice meteors to create oceans.

The Earth 2XXX Scenario



Developing this planet teaches you how the present-day Earth evolved. Challenge yourself to build a new improved Earth. You must solve all the problems by using the planetary development skills you have learned.

Random Planet Scenario



After selecting RANDOM PLANET you may choose a time that outlines the planet's development from one of these four time scales. *Geologic, Evolution, Civilized, and Technology.*

First set up the level (see page 17), then select the time scale. A window showing these scales will be displayed. Select the time scale with the control pad, then press the A Button.

Geologic Time Scale

The Earth, formed 4.5 billion years ago, is believed to have been created from interstellar matter. The surface of the planet was covered with hot lava which cooled to form solid crust. Water vapor in the air fell in the form of rain to create the oceans.

The Geologic time scale starts with a newly formed planet. After the evolution of multi-cellular organisms is confirmed, you may proceed to the Evolution time scale.

Evolution Time Scale

This epoch starts with the emergence of diversified multi-cellular organisms. You must fill the planet with multi-cellular plants and animals.

In this time period, you must survive periodic extinctions and promote the development of an intelligent species able to reach civilization. You can move to the Civilization time scale when this occurs.

Civilization Time Scale

Intelligent life is now capable of civilization. The Civilization time scale starts and so do the problems: Cities evolve, wars begin, and pollution occurs.

You must develop the civilization until an Industrial Revolution occurs that will bring you into the Technology time scale.

Technology Time Scale

In this time period, the Industrial Revolution has occurred and technology has rapidly developed. Major breakthroughs have been made in energy production, medicine, and agriculture. Environmental deterioration and pollution are becoming serious problems.

The ultimate goal of this time scale is to colonize another planet for human migration. You must develop the technology level while maintaining an environmental balance.

Daisy World



This scenario is based on the original Daisy World program that James Lovelock developed as a model of his Gaia Theory. His theory states that life and the environment constitute a system that self-regulates climate and atmospheric composition.

The only life-form on this planet is the daisy. This unique flower has petals that regulate the temperature by reflecting different amounts of light and heat.

TIME SCALE: Evolution time scale

Problems: The heat from the sun is steadily increasing. If it is not properly regulated, the oceans will boil away and all life on the planet will perish.

Hints: There are almost no clouds in this world, therefore, there is little risk of the greenhouse effect. If the temperature is low, black daisies will grow, and if the temperature is high, white daisies will grow. Select the PLANT icon to see a graph on daisy growing.

SELECTING LEVELS

Energy in SimEarth is very important: before starting to play, you should learn more about it. There are two uses for energy in SimEarth: one is for the SimEarthlings and the other is for yourself.

The SimEarthlings use energy for developing their civilization. It is generated from fossil and nuclear fuels. You do not have to be concerned about the value of the energy—just its allocation. The energy that you use is provided at the beginning of the game according to the level at which you are playing. Every time you give a game command, energy is used, and it is recovered as your planet evolves. The energy value is given in Ω (Omega) units.

The level setup depends on the amount of energy you are given in the beginning of the game. Since each time scale differs in the amount of energy used, choose the energy level to match the requirements of the time period.

If you select RANDOM PLANET or DAISY WORLD, you can vary the energy level. Choose which energy level you want with the control pad and press the A Button.



Unlimited

In this option, you can use an unlimited amount of energy. The energy value on the Model Control Panel is set at a moderate level. Unless there is a big change, the value will remain unchanged. You do not have the UNLIMITED option in the Scenario mode.

Easy

This is the mode for beginners. The starting value is 5000 Ω , and it will not increase after time passes. The Model Control Panel is set at a moderate level and will remain unchanged.

Normal

The starting energy value is 2000 Ω and it will not increase. The Model Control Panel is set at a moderate level and will not change.

Difficult

The starting and maximum energy level is 2000 Ω . The Model Control Panel is set at random. With this mode, plants and animals do not evolve on their own, you need to allocate energy for their evolution.

SCREENS

There are three main screens in SimEarth: the MAP mode, the EDIT mode and the GLOBE mode. To view the whole planet, use the MAP and the GLOBE modes. To get more detail, use the EDIT mode. To switch from one screen to another, use the MAP mode icon. Changing from EDIT mode and MAP mode is done by using the Select Button.

The ICON window can be displayed on any mode screen but the COMMAND

screen is used only with the EDIT mode.



MAP MODE

This is a mode that shows the map of the entire planet. To get a view of the entire planet, use this function.

The area within the large rectangular cursor is the territory that will be displayed in the EDIT mode. Move the cursor with the control pad to change the area shown.

These are some features of the MAP mode:

1. Display area of the EDIT mode
2. Overview of the planet.
3. Icon is displayed with the Start Button
4. Data index Box provides information on the data shown in the overview map.
5. Information Box displays the age of the planet, the amount of the energy required to implement a command, the total energy left, and the warning message.



EDIT MODE

This is the mode for investigating the planet, allocating organisms and making events such as storms occur.

To change the view on the screen, move the rectangular cursor to a corner of the screen so that it will scroll in that direction. Use the L or R Button to see your location in relation to the global map. An overview map will appear in the upper corner of

the screen.

These are some features of the EDIT mode

1. The area on the overview map is displayed in the EDIT mode by pressing the L or R Button.
2. Use the cursor to allocate plants, animals, events etc.
3. Information Box displays the age of the planet, the energy required to implement a command, the total energy left, and the warning message

GLOBAL MODE



This mode displays the entire planet in its global form. Although the shape is different, this is the same view as the MAP mode. The planet rotates on its own but you can change the direction it is rotating by using the control pad.

These are some features of the GLOBAL mode.

1. This is the display area in the Edit mode.
2. Overview of the planet
3. The icon is displayed with the Start Button
4. Data Index Box provides information on the data displayed in the overview of the planet.
5. Information Box displays the age of the planet, the energy required to implement a command, the total energy left, and the warning message.

ICONS

There are eight different icons. They provide planetary information and change the game setups. Only the Model Control Panel has the function to control the setup of the planet.

To display the icon window, press the Start Button in any mode screen. Select the icon with the control pad and then press the A Button. The icon window will disappear when you press the B Button.

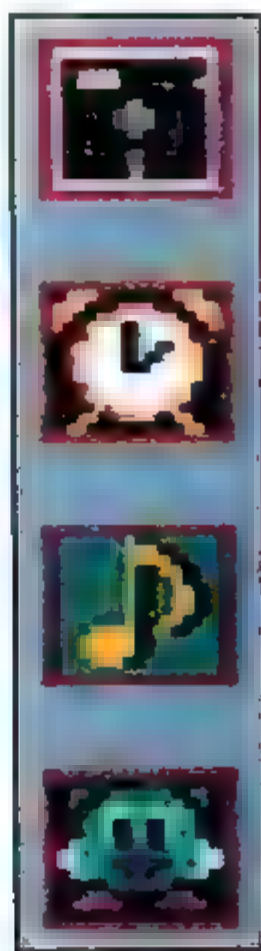


**DATA
DISPLAY**

MODE

**MODEL
CONTROL
PANEL**

GRAPH



**SAVE AND
LOAD**

SPEED

MUSIC

GAIA

DATA DISPLAY



With the control pad and the A Button, you can bring up types of data in the index box. To cancel the command, either select EXIT or press the B Button. You can choose from the following options:

<p>GEO (Geography) Displays the altitude and the depths of the water.</p>	<p>EVENT Displays events occurring in all parts of the world.</p>	<p>SEA CUR (Sea Currents) Shows the direction of the ocean currents.</p>
<p>MAGMA (LAVA) Shows the direction of the continental drift.</p>	<p>WATER TEMP (Water Temperature) Shows the temperature of the oceans.</p>	<p>RAIN (Rainfall) Displays the amount of rainfall.</p>
<p>TEMP (Temperature) Shows the atmospheric temperature.</p>	<p>PLANTS Displays the distribution of each type of plant.</p>	<p>ANIMALS Displays the distribution of each type of animal.</p>



MODE CHANGE



To change from mode to mode, use this command. You can switch from MAP mode, GLOBAL mode, and EDIT mode with this command. Select this command with the control pad and press the A Button. If you are switching between the MAP mode and the EDIT mode you can use the Select Button
(See page 18)

MODEL CONTROL PANEL



This command brings up four types of Model Control Panels. Use the control panel to change the values of the planet simulations.

First select MODEL CONTROL PANEL from the ICON Window.

Then press the A Button so that the submenu appears. Then select the parameter you wish to change and press the A Button.

Geosphere: Brings up the Crust Control Panel.

Atmosphere: Brings up the Atmosphere Control Panel

Biosphere: Brings up the Life Control Panel.

Civilization: Brings up the Civilization Control Panel.

The parameters that can be changed are displayed on the control panel. Use the control pad to move the arrow cursor to the parameter that you want to change, then press the A Button. Now the arrow will move to the parameter. Remember, bringing up each control panel, whether you change the values or not, uses 100Ω of energy.

The scales adjust the level of the parameter and the speed. If you want to increase the value of the parameter, turn the indicator to the right, to decrease the value, turn the indicator to the left with the control pad. Press the A Button to make your choice. The B Button cancels the choice, leaving the value unchanged and the arrow in its original position.

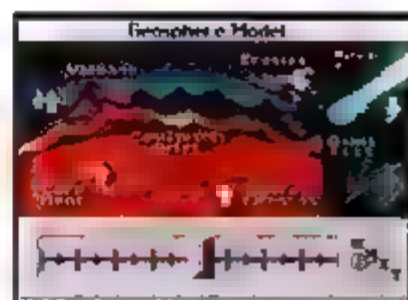


To return to the game, either press the B Button or select EXIT and press the A Button.

For the Mars, Venus, Ice Planet, and the Dune Planet scenarios, only the Civilization Control Panel can be modified.

Geosphere Control Panel

This control panel controls the geological features of the planet. It takes millions of years to see changes in geological conditions, so unless you use the Geological time scale you may not be able to see the changes.



VOLCANIC ACTIVITIES

This controls the frequency of the periodic volcanic eruptions. In the early stages of planetary development, volcanic eruptions are important for shaping the continents.

EROSION

This function controls the speed of erosion of mountains and other terrains by wind and rain. As erosion progresses, topographical formations such as rock shelves, shallows, and sand banks are formed.

CORE HEAT

This controls the temperature of the planet's core. The hotter the core, the larger the volcanic eruptions will be. By increasing the core temperature, larger islands and higher mountains are created by volcanic eruptions. Additionally, the direction of magma flow is easily changed.

CONTINENTAL DRIFT

This feature controls the speed at which the magma current flows. The magma flow affects the movement of the continental plate floating above the liquid magma.

CORE FORMATION

The formation speed of the planet's core is controlled by this function. The planet's core is formed by the molten magma cooling and condensing into a tightly packed center. The larger the core of the planet, the thinner the magma layer will be, consequently, if the magma layer is thin, then the magma will flow slowly.

METEOR IMPACT

This controls the frequency of periodic meteor strikes. In the early stages of a planet's development, a large number of meteors crash into the planet affecting the continental formation.

AXIAL TILT

This controls the tilt of the planet's spin axis. The axial spin influences the severity of the seasons. If the planet tilts more steeply, then the seasons are severe. This is noticeable only in the Civilization time scale.

Atmosphere Control Panel

This control panel deals with the variable factors affecting the atmosphere, which include light and temperature. This determines the planet's capability to support plant and animal life.

SOLAR INPUT

This controls the incoming solar heat and radiation. Setting this scale on the lowest reading will turn the sun off.

CLOUD ALBEDO

This controls the amount of solar radiation that reaches the planet by limiting the reflectivity of the clouds. The lower the reflectivity the more radiation reaches the planet, therefore, the atmospheric temperature will be higher.

GREENHOUSE EFFECT

This feature controls the intensity of the temperature-raising greenhouse effect. The greenhouse effect is caused by vapor, methane, carbon dioxide and other gases in the atmosphere that block the outgoing heat, which causes the planet's temperature to rise.

CLOUD FORMATION

This controls the number of clouds formed from a certain quantity of water vapor.

RAINFALL

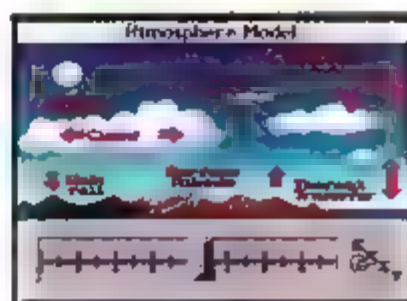
This controls the amount of rainfall on the entire planet.

SURFACE ALBEDO

This controls the heat reflectivity of the continent's surface. The lower the albedo, the more solar radiation is absorbed by the planet.

THERMAL TRANSFER

It controls the amount and the rate at which the air and ocean can exchange heat.



Biosphere Control Panel

The Biosphere control panel deals with the variable factors affecting the biosphere of the planet. It is most effective in an Evolution time scale, where you are more able to distinguish the variation in the number and species of animals.

THERMAL TOLERANCE

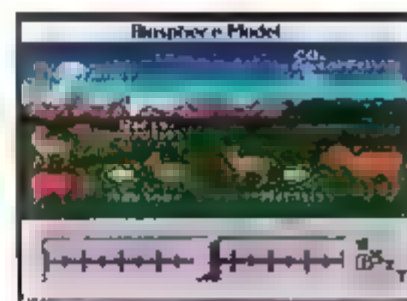
This feature controls the temperature range in which life can survive. The higher the setting, the wider the range of plants and organisms able to survive.

REPRODUCTION RATE

This controls the reproduction speed of organisms. In the early stages of the development of life-forms, it is advisable to increase populations quickly, although you should take into consideration the future use of fossil fuels.

CO2 ABSORPTION

This function controls how much carbon dioxide (CO2) is absorbed from the air by plants. Excessive carbon dioxide is one of the factors of the greenhouse effect.



Lowering the level of carbon dioxide in the atmosphere lowers the temperature. One way to reduce carbon dioxide is to use the terraformer's oxygenator to remove the CO₂ from the atmosphere, however, it is more effective to let the plants keep a natural balance.

ADVANCE RATE

This controls the rate at which life-forms advance to a higher level of development. As evolution progresses, intelligent life emerges and builds a civilization. Usually only one species advances to the level of developing a civilization.

MUTATION RATE

This controls the probability that a life-form will mutate. A species that mutates does not undergo the same evolutionary process as other members from the same species, which results in the emergence of an entirely new species. Once it has mutated into a new species, it will not regress. There is more explanation of species mutation in the LIFE-FORMS page under COMMAND.

Civilization Control Panel

This panel deals with the maintenance and control of the civilization of an intelligent species.

ENERGY INVESTMENT

This feature determines the level of energy needed to build and maintain that species.

BIOENERGY

This is energy released from burning wood, animal and plant energy, and work done by hand. Included in this definition is recycled fuel. Bioenergy will reach higher efficiency through the invention of tools and the establishment of scientific theories. Bioenergy emits carbon dioxide into the atmosphere, causing minor pollution.

SOLAR/WIND

This is energy produced by windmills, sailing ships, wind-powered generators and solar heating. Efficiency is higher with higher technology.

HYDRO/GEO

This is energy generated through waterwheels, dams, steam power, and geothermal power. This is more efficient with higher technology.

FOSSIL FUEL

These are coal and crude oil. The amount of these fossil fuels is determined by the number of life-forms in the evolution time scale. The greenhouse effect is triggered by burning fossil fuels.

NUCLEAR

This type of fuel includes atomic reactors and bombs—energy created by nuclear fission. Radioactivity is released when nuclear explosions or meltdown occurs.



ENERGY ALLOCATION

This feature determines the energy allocation ratio of energy produced by Energy Production.

MORAL

Morality is a deterrent to war. If you allocate energy here, it will reduce the intensity of violent conflicts on the planet.

SCIENCE

Investing energy in science helps civilization's advancement toward a higher technology level. If you invest a low level of energy in science it will slow or stop advancement. You must maintain a balance with other factors or civilization will not be stable. Also, if you invest in science too early, your population may succumb to wars and plagues.

FOOD

Agriculture, important for the advancement of food production, increases population.

MEDICINE

It decreases the number and severity of plagues.

ART

Art improves the quality of life for intelligent species.

GRAPH

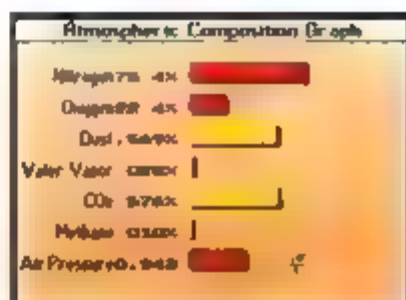


Graphs are useful in discussing details and showing precisely the conditions which have occurred. Select this feature with the control pad from the submenu, then press the A Button. Use the B Button to cancel this function and return to the MAP mode.



Atmospheric Composition Graph

This graph displays the percentage ratio of each of the atmospheric gases: nitrogen (N₂), oxygen (O₂), carbon dioxide (CO₂), and methane (CH₄), plus dust particles and water vapor (H₂O). A + or - attached to the end of a gas indicates whether the quantities are increasing or decreasing. Gases with no signs attached are temporarily stable in ratio.



The Earth's atmosphere is made up of 15% to 25% oxygen. Life cannot survive without enough oxygen, but too much oxygen makes the planet prone to fire disaster. The other components of the atmosphere must be in balance as well for life to flourish. Plants cannot survive without carbon dioxide, and too much dust shuts out solar radiation leading to extinction of the planet. Water vapor, carbon dioxide, and methane in high proportions cause the greenhouse effect.

Biome Ratio Graph

This graph displays the number of each type of plant. New data replaces the old as time progresses.

Life Class Ratio Graph

This graph displays the number of each type of animal. As the population changes, the graph is adjusted accordingly.

Technology Ratio Graph

This graph displays the civilizations.

History

This graph shows how various elements of the planet changed over time. It is possible to check on any of the 15 items displayed in the window. Four types of data can be displayed at the same time. Select a screen from the submenu.

CO₂: Amount of carbon dioxide in the atmosphere.

O₂: Amount of oxygen in the atmosphere

CH₄: Amount of methane in the atmosphere

WATER TEMPERATURE: Average temperature of the planet's oceans.

ATMOSPHERIC TEMPERATURE: Average atmospheric temperature of the planet.

RAINFALL: Average rainfall.

POPULATION: Total population of the planet's civilized life-forms.

BIOME: Total amount of plant and animal life on the planet. 99% of the biome layer consists of plants.

FOSSIL FUEL: Amount of fossil fuel (coal, oil etc.) stored. Storage rate increases during the Evolution time scale but decreases during the Civilization time scale.

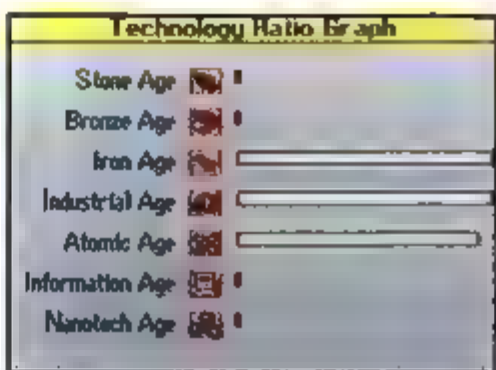
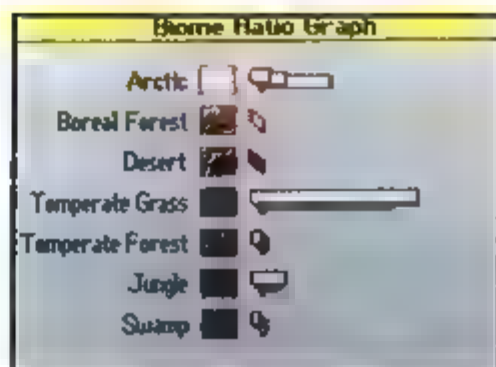
NUCLEAR: Storage rate of nuclear fuel.

FOOD: Amount of food produced on the planet

WAR: Frequency of armed conflict on the planet.

PLAGUE: Number of plague outbreaks.

POLLUTION: Amount of pollution and toxic waste that is littered on the planet.



History



Planet Report

This function displays the report screen that updates the current status of the planet.

You are given information on time scales, total number of life-forms, the most advanced life-form, the most modernized civilization and the population of the civilized species. You can also see the energy production and allocation for the SimEarthlings after they have achieved civilization. Use REPORT to confirm the effect of changing values on the Civilization Control Panel. The goal is to proceed to the next level.

Planet Report				
Technology		Time Scale		
Biomass :		11277		
High Life :		Mammals		
High Tech :		Atomic Age Technology		
Pop :		609		
Work	x	Eff	x= Energy	Allocation
30		64%	2348	3455
22		37%	1007	3554
12		48%	702	3455
00		80%	00	3455
00		10%	00	3455
Task : Migrate to other planet				

SAVE AND LOAD



Save your game with this icon. If you want to restart your game from the same place, select LOAD. It is only necessary to save your game once before you quit.



SPEED



This icon is used to change the speed or to stop the passage of time in the game. You can stop or slow time to give yourself time to think or you can speed it up.

Select the speed with the control pad and press the A Button.



MUSIC



This is the icon that switches the music on and off. Use the control pad to make your selection and press the A Button.

GAIA



Gaia is the planet itself. When you have a problem in the scenario, Gaia will give you hints.



COMMAND

The Command function is very important in controlling SimEarth. A single command may lead to success or failure. The execution of commands is consistent throughout the game.

First press the Y Button on the Edit mode screen so that the Command window will be displayed. With the control pad, select the command to be operated and press the A Button. All sub-commands are displayed except for INVEST.GATION. Select sub-commands with the same procedure. The window disappears after you choose the command or if you cancel the command.

Where applicable, decide the location of the command with the cursor in the Edit mode screen and press the A Button

PLANTS

This is the command to place biomes on the planet. By placing more plants, the planet is more hospitable to life. Even if you do not use this command, biomes will automatically be placed on the planet if the climate, temperature, rainfall and other conditions are met. Plants may not stay where you put them. An Arctic biome will not last long in the hot equatorial zone and a jungle will not thrive at the planet's pole.

For each biome planted, 50Ω of energy will be consumed.



ROCK

No life can survive on bare rock. No plant can be planted if there is neither CO2 nor rain. Mars and Venus are covered with rocks.

ARCTIC

Arctic climate is cold and dry. No plants and animals can survive here.

BOREAL

This climate (also called taiga) is cold with high to moderate rainfall. All the land animals can survive here.

DESERT

It has moderate to high temperatures and very little rainfall. Except for reptiles, there is no animals.

TEMPERATE GRASSLANDS

This climate has moderate temperatures and high rainfall. Land-dwelling animals flourish here.

FOREST

The forest climate has moderate temperatures and high rainfall. Many kinds of plants and animals live here.

JUNGLE

This climate is characterized by high temperatures and rainfall. Numerous species of animal can live here. The plants produce a lot of oxygen.

SWAMP

The swamp has high temperatures and moderate rainfall. Next to the jungle, the highest number of species make their home here. Some marine animals can live here as well.

OCEAN

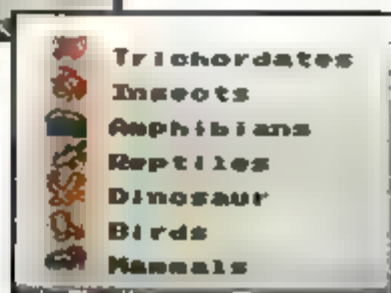
Formed 600 million years after the formation of the Earth, the oceans are an important water source for the planet. Additionally, the ocean greatly influences the climate.

LIFE FORMS

There are 15 classes of life represented in SimEarth: seven in the ocean and eight on land. You can place 14 of these with the Place Life tool. The other life-form, the Carnifern, is a mobile, carnivorous plant that can evolve into an intelligent creature.

Each class consists of 16 species. If a class of life reaches the 16th species, it will become an intelligent life-form. The 16th species of many classes will never appear unless you help that class develop its intelligence.

At the end of each description, the necessary cost of energy to place these life-forms is shown.



SEA LIFE CLASSES

Prokaryotes



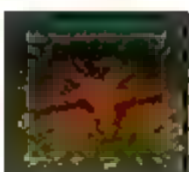
This is a simple, single-celled life that first appeared on Earth 3.5 billion years ago. It has no distinct nucleus. One example of a prokaryote is bacteria. Bacteria releases methane into the atmosphere. The eight most advanced prokaryote species are able to mutate into eukaryotes (35Ω).

Eukaryotes



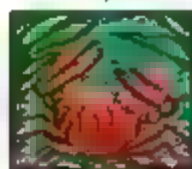
These are single-celled organisms with nuclei, and they include all single-celled life-forms except prokaryotes. They evolved from prokaryotes 2 billion years ago. The four most evolved species of eukaryote can mutate into radiates (70Ω).

Radiates



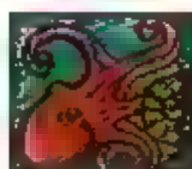
Radiates are radially symmetrical multi-cellular life with definite tissue layers but no distinct internal organs, head or central nervous system. They first appeared on Earth 700 million years ago. The first eight species can mutate into arthropods and the next four species can mutate into trichordates (105Ω).

Arthropods



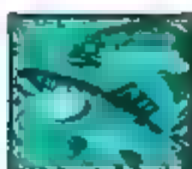
This species evolved on Earth 600 million years ago. They are animals with jointed legs and a hard outer skeleton that live in the ocean. The first four species can mutate into mollusks, the next eight can mutate into insects (140Ω).

Mollusks



These also evolved 600 millions years ago. They are a fairly complex animal. The middle eight species of mollusks can mutate into fish (175Ω).

Fish



This is a very advanced sea creature with an internal bony skeleton that evolved 430 million years ago. The first eight species can mutate into amphibians and the next four can mutate into trichordates (210Ω).

Cetaceans



These are marine mammals with a highly developed nervous system. Cetaceans can survive on land, too. They actually live in the jungle rivers. They evolve from mammals. The last four species can mutate back into mammals (245Ω).

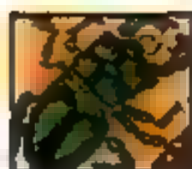
LAND LIFE CLASSES

Trichordates



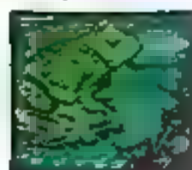
Trichordates were a class of animal with three spinal cords. They flourished and became extinct a long time ago on real Earth. In SimEarth they are given a chance for survival. Trichordates cannot mutate into anything else (280Ω).

Insects



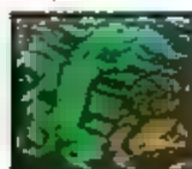
The most numerous type of life on Earth. Insects evolved from arthropods about the same time that plants grew on land. Insects do not evolve into anything else, but there is a co-evolution with carniferns (315Ω).

Amphibians



These cold-blooded vertebrates are somewhere between fish and reptiles and were the first life to live on land 410 million years ago. The first eight species of amphibians can mutate into reptiles (350Ω).

Reptiles



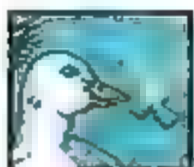
Reptiles are cold-blooded vertebrates that evolved from amphibians 330 million years ago. The first eight species of reptile can mutate into dinosaurs. The next four species can mutate into mammals (385Ω).

Dinosaurs



They are large reptiles that appeared 260 million years ago, then become extinct 65 million years ago on real Earth. The first four species of dinosaurs can mutate into avians and the next four species can mutate into mammals (420Ω).

Avians



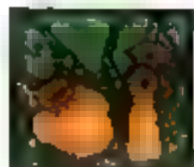
Avians (birds) evolved from flying dinosaurs 220 million years ago. They are warm-blooded vertebrates with bodies covered with feathers and wings for forearms. They cannot mutate into anything else (455Ω).

Mammals



Evolving 220 million years ago, mammals are the highest form of warm-blooded vertebrates. They nourish their young with milk secreted from their mammary glands and have skin covered with hair. Human beings appeared 4 million years ago. The middle eight species of mammals can evolve into cetaceans (490Ω).

Carniferns



These are mobile, carnivorous plants that are treated like animals. They evolved from plants, and they eat insects for food. Carniferns are the only life that we cannot place with the Place Life tool. They evolved from insects, but it is rare to have carniferns achieve intelligence. They will not mutate into anything else.

CIVILIZATIONS

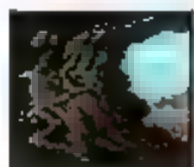
There are seven different levels of civilization, each with a unique science technology level. Most cities have three population densities which continue to develop through trade and communication. As the population increases, the color of the box will change from red to blue to yellow.

You can place these cities just like you do with the plants and life-forms but you may not be able to place a city that does not fit in the actual period.

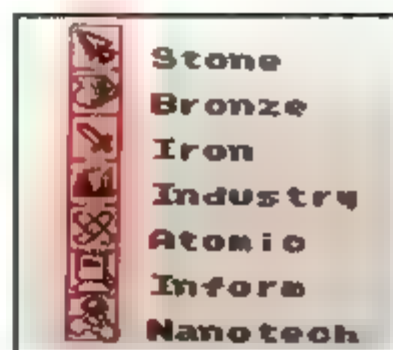
The cost of energy to place each civilization is written at the end of each description.

Stone Age

This is comparable to the civilization on the real Earth that



was thought to have begun a million years ago. People started to use fire and organized society in groups. The period is characterized by the use of stone tools (500Ω).



RED



BLUE



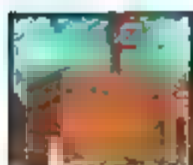
YELLOW

Bronze Age



Characterized by the regular use of metals for tools and weapons, the established era for the Bronze Age dates back to 3500 BC. Agriculture was also started in this period (1000Ω).

Iron Age



The Iron Age began nearly 3000 years ago. It is characterized by the use of iron for agricultural tools and weapons (1500Ω).

Industrial Age



This age relates to the time from the Industrial Revolution of the mid 18th century to the beginning of the Atomic Age. It is characterized by the use of power machinery and also by the problems of environmental destruction (2500Ω).

Atomic Age



Beginning in 1950 with the first use of atomic energy, it corresponds to the present-day Earth. We are using up the Earth's fossil fuels (2500Ω).

Information Age



The information Age is the next step after the Atomic Age. It is hypothesized to begin in the year 2000. Computers are introduced into our daily lives and information becomes the most important tool (3000Ω).

Nanotech



This age is far in the future of Earth, and it will be characterized by a level of technology that allows terraforming and colonizing of other planets. In this age, people use transporters for trade and space travel (3500Ω).

TERRAFORMERS

Terraformers are tools for turning Venus and Mars into earth-like planets. Once placed, terraformers keep working. Do not place too many—the only way to stop one is to destroy it. Their costs in energy are also stated after each description.



Biome Factory



When you are terraforming Mars and Venus, sometimes it is better to place a Biome Factory instead of individual biomes. The Biome Factory gauges the terrain, climate and stars and produces the appropriate biome type capable of surviving there. It can also detect changes in climate and will change the biomes it produces to a type that will survive those changes. Biome Factories cost 500Ω.

Oxygenator-O₂ Generator



The Oxygenator takes carbon dioxide (CO₂) out of the atmosphere and returns free oxygen. Too much oxygen in a planet's atmosphere will cause fires. The present Earth's atmosphere contains 20% oxygen. Since oxygen reduces carbon dioxide, a main contributor to the greenhouse effect, the Oxygenator will help cool a hot planet. An Oxygenator costs 500Ω.

N₂ Generator



The N₂ (Nitrogen) Generator is used to increase atmospheric pressure on a planet. The atmospheric density affects the planet's temperature, a denser atmosphere allows the planet to retain more heat. For example, if the atmosphere is thin, the temperature is very unstable. Also, having an atmosphere with a lot of nitrogen stabilizes the proportion of other gases. A large percentage—70%—of the present Earth's atmosphere is nitrogen. A N₂ Generator costs 500Ω.

Vaporator



The Vaporator spews water vapor into the atmosphere, which raises the overall humidity of the planet causing more rain to fall. Too much vapor will increase the planet's temperature and cause the greenhouse effect. A Vaporator costs 500Ω.

CO₂ Generator



The CO₂ Generator produces carbon dioxide, which is necessary for the survival of green plants. Too much CO₂ raises the planet's temperature and causes the greenhouse effect. A CO₂ Generator costs 500Ω.

Monolith



The Monolith is an evolution speed-up device that stimulates the development of intelligent life. To use it, select MONOLITH, then click on a life-form that you wish to evolve with the A Button. There is a 1-in-3 chance that the chosen life-form will mutate to a higher level. The Monolith, however, cannot be used on all life-forms. One disadvantage to using the Monolith is that you can advance your civilization without increasing the amount of fossil fuels. This may cause not only your population to decrease but also your civilization to collapse. Do not rush to a new time scale at the expense of your population. A Monolith costs 2500Ω.

Ice Meteor



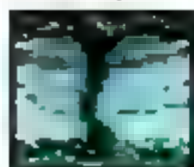
The Ice Meteor is a huge chunk of ice that you can crash into a dry planet to add water to the planet. You can use this to create an ocean. An Ice Meteor costs 500Ω.

EVENT TRIGGER

Various events will happen randomly and are automatically controlled by the simulation. Depending on many factors, such as the age of the planet, the climate, air and water temperatures and sea level, you can cause most events on your planets.

Before triggering events yourself, you should know the effects that these events have on local populations as well as the planet. All events cost 50Ω.

Storm (Hurricane)



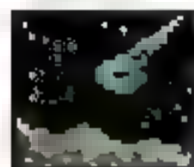
This is a tropical storm with winds of 74 mph or greater usually accompanied by rain, thunder and lightning. It can cause tidal waves. Hurricanes are caused by warm oceans and can destroy cities. You can use hurricanes to increase rainfall.

Tidal Waves



This is an unusually high ocean wave that is caused by either earthquakes, high winds, hurricanes, volcanos or falling meteors. Tidal waves can destroy coastal cities and land dwelling life. Tidal waves are useful for eliminating unwanted coastal cities or for cleaning up an area that is contaminated by radiation.

Meteors



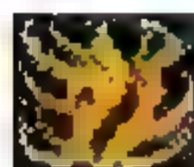
Meteors are huge pieces of space matter that smash into the planet creating land craters and tidal waves. Meteors that crash into land will send dust into the atmosphere. Too much dust will block the sun and may cause extinctions. Meteors that crash into water put vapor into the air, causing rainfall. Meteors are useful for adding water vapor to the atmosphere (thereby increasing rainfall), creating lakes and destroying unwanted land-forms.

Volcano



A volcano is a vent in the planetary crust that lets a flow of molten rock to the surface. Volcanos put a lot of ash in the air, blocking the sun and causing extinctions. They also add a lot of carbon dioxide to the air. Volcanos in the ocean cause tidal waves. Volcanos are less severe when the planets are young and the core is larger. Volcanos elevate the terrain, creating islands and mountains.

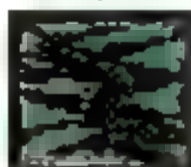
Fire



Fires occur when the oxygen content of your atmosphere is too high. Fires are useful for regulating the oxygen in your atmosphere and causing general destruction.



Earthquake



When you point to the Trigger Earthquake option a sub-menu will appear allowing you to select the direction of energy expended by the earthquake. This will let you affect continental drift. When earthquakes appear naturally, they occur at plate boundaries (a place where two land masses meet). There is no way to avoid earthquakes, but to avoid their damage do not place cities near plate boundaries. To find these boundaries, look at the MAGMA display in the EDIT Window. Wherever arrows that point in opposite directions are next to each other, that is a boundary.

Plague



Plagues are very dangerous diseases that can destroy towns and will spread to nearby cities. They happen more often in areas with low technology, but once plagues begin, they can quickly spread to areas with high technology. Plagues are not useful for anything but destruction.

OTHER EVENTS

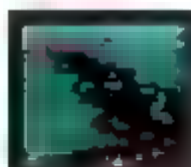
There are some events that you cannot cause. These events will occur automatically depending on many factors.

War



War represents battles between intelligent life-forms. They might be battles between cities as well as rebellions and revolutions. Wars are often caused by competition for resources such as fossil and atomic fuel. Cities grow too big and too quickly for the local fuel supply and so they go to war in order to control the fuel supply. Some wars occur without an apparent cause.

Pollution



Events involving pollution are warnings that pollution in an area of your planet has reached levels that are dangerous to living creatures. They are primarily caused by industrial wastes and pollutants and can only be prevented and controlled by investing in nonpolluting energy sources such as atomic fuel.

Nuclear Winter



When too many atomic tests are done or a nuclear power plant melts down, the land will be contaminated by radiation. As time passes, the contamination will diminish but no life can survive when this symbol is evident.

Exodus



When the intelligent SimEarthlings reach a high enough level of development, they leave the planet to colonize other worlds.

Treasure Box



In each scenario there is one present for you. Sometimes the present is there from the beginning. Other times it will appear when you do something. There is no indication when the present is placed.

There is a possibility that you will not notice it until you finish the scenario. To find it, you must search in the EDIT mode. When you find a pink treasure box, EXAMINE it and Gaia will tell you its effect.

SET ALTITUDE

This command allows you to raise or lower sections of land. If you click on the SET ALTITUDE icon, it shows a submenu with two choices: RAISE and LOWER. You can practice in the EDIT mode. The cost for using the SET ALTITUDE command is 50Ω.



When you use this command, you should look at the altitude and the depths of the sea as a whole with the GEOSPHERE command in the DATA icon. Levels of terrain are displayed in shades of color. For example, a lighter shade means a higher altitude, and in the ocean a darker shade means a deeper sea level.

The change in geosphere has effects on climate, rainfall, biosphere and life-forms. Consider the impact that an altitude change would have on life before you make mountain ranges, lakes or islands.

EXAMINE

This command is useful in the EDIT mode. It gives you all the information about each spot. After you select EXAMINE, move the cursor to a spot that you want to examine with the EDIT mode screen and press the A Button. The information window will appear and give you the details of the thing you are looking at.

The cost for using the EXAMINE Command is 5Ω. You will need this information in planning your next planetary development move.



SOME COMMON QUESTIONS ABOUT SIMEARTH

There are many problems and challenges you will face in your quest for planetary development. Here are some suggestions to deal with them.

Q After a certain point why does evolution in water seem to stop?

A Most advanced aquatic life-forms live in shallow water. If there are not enough shallow shelves, you will hit an evolutionary dead-end. You can create shelves either by raising the ocean floor or by lowering the land. You can do that with the SET ALTITUDE command. You can raise the ocean floor with volcanoes with the EVENT command too. You can also lower the land with meteors with the EVENT command.

Although aquatic life-forms can become intelligent beings, they cannot become civilized since they cannot use fire.

Q: Why do mass extinctions occur?

A: Mass extinctions are caused by too much dust in the air, too little oxygen (less than 20%) in the atmosphere or too low of a temperature. When the temperature is low, raise the level of SOLAR INPUT and GREENHOUSE EFFECT or place the CO2 Generator of the Terraformers. There is nothing you can do to decrease the amount of dust except let it disperse over time. Do not forget to avoid meteors and volcanic activities.

Q: What do I do to avoid meteor storms?

A: You can avoid meteors by lowering the level of METEOR in the CORE Panel. After the meteor storm, there will be a lot of dust and the temperature will decrease. Do not forget to raise the temperature. Meteor storms are a warning that extinctions are imminent. Prepare for the worst and get ready to rebuild your biomass.

Q: How I avoid the planet overheating?

A: In order to avoid planetary overheating, first you must check the CO2 levels. To decrease the temperature you can do three things. Place a Terraforming Oxygenator. Increase the level of CO2 Absorption in the Biosphere which will increase the number of plants. Decrease the levels of Solar Input and Greenhouse Effect in the Atmosphere Control Panel and increase the levels of Cloud and Surface Albedos.

Q: How do I control fires?

A: Excessive fires are due to too much oxygen in the atmosphere. Place the CO2 Generator on your planet to balance the oxygen.

Q: How do I control tornados?

A: Tornados happen when the sea temperature is high. Decrease the levels of SOLAR INPUT and GREENHOUSE EFFECT and increase the level of THERMAL TRANSFER in the Atmospheric Control Panel.

Q: There are too many wars occurring. How can they be stopped?

A: In SimEarth, wars occur because of the lack of fuel. Decrease the energy investment of FOSSIL FUEL and NUCLEAR in the Civilization Control Panel. Wars also occur when the energy allocation for Philosophy is low. When a war becomes a nuclear war, decrease the demand for nuclear energy.

Q: How can I speed up the development of civilization?

A: Increase the level of SCIENCE in the Civilization Control Panel.

Q: How can I increase the birthrate and the population?

A: Increase population by increasing the agriculture in the Civilization Control Panel.

Q: How I can save Fossil Fuels?

A: When the Evolution Time Scale is too short, the planet lacks fossil fuel. For now, you should decrease the level of fossil fuels in the Civilization Control Panel. If you were in the Industrial Revolution period increase the level of science so that you will proceed to the Atomic Age. Also wars occur when fossil fuels are in short supply so put some more energy in Philosophy.

Q: I do not want to start a war, but I do not want to use too much nuclear energy.

A: Use less nuclear energy and since wars do occur, put more energy into Philosophy

Q: How can I avoid pollution?

A: Use less fossil fuel and more nuclear energy. When you are not yet in the Atomic Age invest in science and advance to the Atomic Age as quickly as possible.

Q: How can I improve the quality of life?

A: The number of work hours per week is too many, so the SimEarthling are very tired. Decrease the total investment in energy and put more energy in Art/Media in the Civilization Control Panel.

Q: The land is so contaminated by radiation that the living creatures cannot live there anymore. What can I do?

A: The causes of contamination are nuclear wars and power station meltdowns. Decrease the use of nuclear energy in the Civilization Control Panel. If the contaminated place is near the coast of an ocean, you can rinse the place with a tidal wave.

GLOSSARY

Here are some of the frequently used words in SimEarth. They are also explained in the Dictionary command as well as in the text.

Biome

Biomes are ecological systems of plants and animals. Where a particular biome can survive is dependent on temperature, rainfall and altitude. For the most part, the Biome Command is used in SimEarth to place the plant life on a planet.

Daisy World

This is a planet where daisies are the only living thing. This scenario is based on the original Daisy World program that James Lovelock developed to test the Gaia Theory. This theory suggests that life and the environment together constitute a system that self-regulates climate and atmospheric compositions.

Exodus

This is the time when the intelligent SimEarthlings reach a high enough level of development and leave the planet to colonize other worlds.

Gaianizer

This is you, the one who is developing SimEarth with the Gaia Theory.

Gaia Theory

James Lovelock's theory that the Earth's environment is a self-regulating system in which organisms strive to create a balance in their surroundings.

Life Span

The planets in SimEarth have a life span. The incoming solar radiation (the amount of energy that reaches the planet from the sun) is increasing every year, and it also increases the temperature of the planet until it will be swallowed by the expanding sun. In SimEarth, planets have only 10 billion years to live.

Model Control Panel

You use this to make actual changes in or to modify the simulation.

Monolith

This is a tool to help accelerate the advancement of intelligent species. If you click on a life-form, there is a 1-in-3 chance that the life-form will suddenly mutate into a higher life-form. It will not necessarily work on all animals.

Nanotech Age

This is the ultimate level of technology in SimEarth.

SimEarthlings

These are electronic living creatures. They include all the life-forms mentioned here from single-cell creatures to intelligent life.

Terraformers

These are tools for regulating the environment. They are not needed on earthlike planets but once the environment is deeply troubled, you must use them.

Time Scale

SimEarth has four different time scales. The Geologic time scale begins just after the planet has formed and ends with the development of multi-cellular life. The Evolution time scale begins with the appearance of multi-cellular life and ends with the development of intelligence. Civilization time scale begins with the appearance of intelligent organisms and ends with the Industrial Revolution. Technology time scale begins with the Industrial Revolution and ends with Exodus.

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- Reorient the receiving antenna
- Relocate the Super NES with respect to the receiver
- Move the Super NES away from the receiver
- Plug the Super NES into a different outlet so that the Super NES and receiver are on different circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems."

This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 004-000-00345-4.

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